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ABSTRACT

In spring 2001, close to 500,000 Arizona students in grades 1 through 9 took the Stanford Achievement Test. This study focuses on reading in the earliest grades and mathematics in the middle grades. Arizona schools have been making progress in reading, lifting students from the lowest achievement levels to higher levels. However, 25% of students remain in the lowest group, and students for whom English is not the primary language are overrepresented in that group. In 2001, Arizona students in grades 1 through 3 scored at the 50th percentile, or at the national average, an increase of six percentile points from 1997. In the middle grades, Arizona schools are making significant progress in moving students up from the lowest achievement levels in mathematics, increasing the likelihood that students will meet the state's rigorous academic standards. Statewide, the mathematics percentile ranks for middle schools (grades 6 through 9) have increased steadily. The Stanford 9 tests offer a look at the performance of Arizona students as the schools increasingly focus on academic skills. (SLD)

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Analysis of Arizona Stanford 9 Test Results Spring 2001

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prepared by:

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July 2001

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Arizona Department of Education

Analysis of Stanford 9 Test Results
Spring 2001

Executive Summary

This past spring, close to 500,000 Arizona students in grades one through nine took the Stanford Achievement Test. The test, a national standardized exam, is designed to gauge the skills of students in three areas: reading, language and mathematics. The Arizona Department of Education released the preliminary state report for the Stanford Achievement Test in early July. This study focuses on reading in the earliest grades and middle school mathematics.

Key findings of the study include:

K-3 Reading

- Arizona schools have been making progress in lifting students from the lowest achievement levels to the higher achievement levels.
- Still, 25 percent of students remain in the lowest group. Students whose primary language is not English are over-represented among that group.
- Lower achievement in early grades and not developing key skills has a compound effect: those students will struggle to move up academically in later grades.

Middle School Mathematics

- Arizona schools are making significant progress in moving students up from the lowest achievement levels.
- Student progress translates into a better development of academic skills
- Attaining academic skills provides a gateway to high school and increases the likelihood students will meet Arizona's rigorous academic standards.

Policy Conclusions

- Arizona schools are focusing increasingly on academic skills.
- That effort is consistent with efforts by schools to align their curriculum with state standards.
- The Stanford Achievement Test offers an important national glimpse at Arizona students' academic success.
- The Arizona Instrument to Measure Standards (AIMS) test is the most direct way to measure academic skills deemed important by Arizona educators and the Arizona State Board of Education.

Analysis of Arizona Stanford 9 Test Results
Spring 2001

During April and May 2001, 493,950 Arizona public school students in grades 1-9 took the *Stanford Achievement Test, Ninth Edition* (Stanford 9) in Reading, Mathematics and Language. For the fifth consecutive year, students showed improvement in virtually all areas of the test. Table 1 depicts the upward trends in test scores.[1]

Table 1 — ***Stanford Achievement Test, Ninth Edition***
Arizona Percentile Ranks
1997-2001

	GRADE											
	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
READING	1997			44	52	50	52	52	54	43	42	46	54
	1998			47	53	51	53	52	54	44	42	46	54
	1999		50	47	54	51	54	53	54	43	42	44	
	2000		52	48	54	51	53	52	53	43	42	45	
	2001	60	53	50	55	51	54	53	55	43			
	97 to '01			+	+	+	+	+	+	NC			
	00 to '01		+	+	+	NC	+	+	+	NC			
LANGUAGE	1997			45	45	40	40	49	45	37	43	42	44
	1998			49	47	42	41	52	46	39	43	43	45
	1999		40	51	49	44	44	54	49	39	44	42	
	2000		43	54	48	45	44	54	49	40	44	44	
	2001		44	56	50	45	45	55	50	41			
	97 to '01			+	+	+	+	+	+	+			
	00 to '01		+	+	+	NC	+	+	+	+			
MATHEMATICS	1997			41	48	47	54	50	50	54	46	49	47
	1998			46	51	51	57	53	52	57	47	51	50
	1999		51	49	54	54	59	55	54	57	49	52	
	2000		55	52	55	55	60	56	56	59	50	55	
	2001		57	54	57	57	63	58	58	61			
	97 to '01			+	+	+	+	+	+	+			
	00 to '01		+	+	+	+	+	+	+	+			

Statewide increases in percentile rank scores show a clear focus and commitment from schools and teachers to student learning. However, if the public discussion centers on percentile ranks alone, the discussion will fail to encompass the full context of student academic achievement.

The purpose of the *Stanford Achievement Test, Ninth Edition* (SAT9) is to compare the performance of Arizona students to a national norming group. As a result, the Stanford 9 test results place a natural emphasis on the percentile rank scores. The successful mastery of key academic skills by Arizona students, however, is the foundation for improved percentile rank scores. Therefore, the focus should be broader than percentile rank scores in order to address the primary purpose of statewide testing in Arizona; to determine if students are attaining key academic skills.

[1] A '+' symbol denotes an increase in achievement between comparison years and 'NC' denotes "No Change."

Academic skills, via instruction in the Academic Standards, are the critical link that binds all components of the Arizona public education system. Therefore, the Stanford 9 test results should be analyzed according to whether students are acquiring important academic skills and how these skills relate to the Arizona Academic Standards. At the school level, the analysis of Stanford 9 scores and the relationship to academic skills is an important tool in the alignment of curriculum and instruction to the Arizona Academic Standards and the evaluation of academic programs.

To that end, the purpose of this report is to use percentile ranks to address whether Arizona students are acquiring key academic skills, to highlight the relationship between test results and student performance on the Arizona Academic Standards and to discuss the implications of skill attainment for future academic success. The advantage of the present analysis is that it reveals important trends in the attainment of academic skills that are not evident based on an analysis of percentile ranks alone. The key findings include:

K-3 Reading

1. Arizona schools have been making progress in lifting students from the lowest achievement levels to higher achievement levels.
2. Despite overall advancements, 25% of Arizona students remain in the lowest achievemement level and students whose primary language is not English are disproportionately represented in the lowest achievement level.
3. Low achievement has a negative compound effect on later academic achievement.
4. Students whose primary language is not English are more likely to remain in the lowest achievement level than students whose primary language is English.

Middle School Mathematics

1. Arizona schools have been making significant progress in lifting students from the lowest achievement levels to higher achievement levels.
2. The upward shift in achievement levels represents improvements in the attainment of academic skills on behalf of Arizona students.
3. An improvement in foundational skills in the 7th grade is reflected as an increase in algebra performance in the 8th grade.

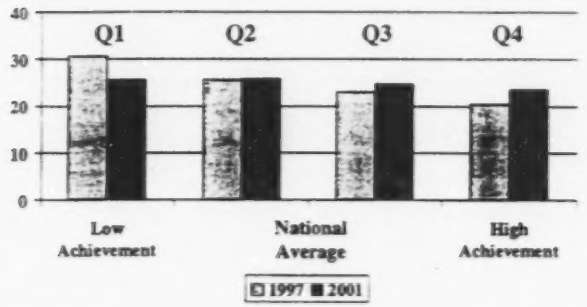
K-3 Reading

In 2001, Arizona students scored at the 50th percentile, or at the national average, an increase of six percentile points from 1997. More importantly, Arizona's schools have been making progress in lifting students from the lowest achievement level to higher achievement levels. Since 1997, the percentage of students in the lowest achievement level has decreased by 4%, while the percentage of students at or above the national average has increased by 5% (see Graph 1)[2].

[2] Low Achievement includes students with percentile ranks of 1-25, Quartile 2 includes percentile ranks of 26-50, Quartile 3 includes percentile ranks of 51-75, and High Achievement includes percentile ranks 76-99.

Graph 1

3rd Grade Reading Achievement
1997 to 2001



This upward shift is important, because students in the higher achievement levels are more likely to be able to perform key early reading skills that will enable them to be successful in later grades. For example, students at higher achievement levels are more capable of performing the following key early reading skills:

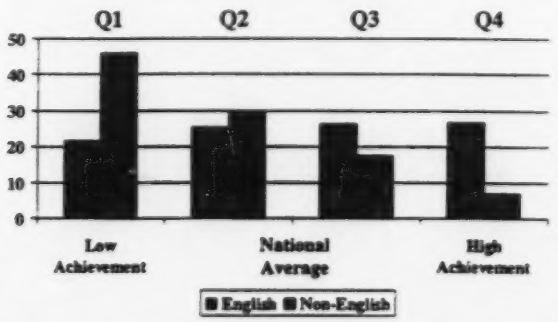
- derive basic meaning from functional text such as maps, directions, forms and advertisements
- make basic inferences and generalizations from text: interpreting main idea, determining cause/effect, making predictions
- read and comprehend material typically read for enjoyment, such as fiction and literature

These key early reading skills are consistent with the Arizona Academic Standards.

Despite the overall gains, 25% of Arizona's students are still in the lowest achievement level and have not demonstrated mastery of early reading skills. Further analysis reveals that students in the most danger of not mastering early reading skills are students whose primary language is not English. Graph 2 reveals a marked difference by primary language. Forty-four percent of non-English speaking students are in the lowest achievement level and less than twenty-five percent of these students are at or above the national average.

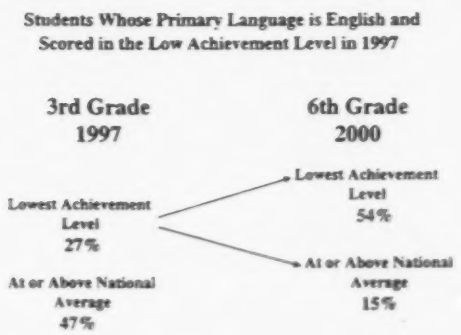
Graph 2

Achievement by Primary Language
3rd Grade Reading, 2001

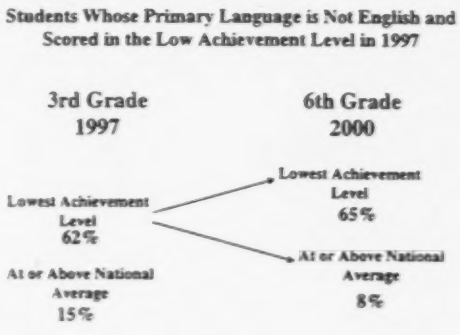


The inability to master early reading skills has a negative compound effect on later academic achievement. Students who do not acquire early reading skills are not prepared to be successful in higher grade levels. Based on an analysis of student level data for the 1997-2000 academic years, it is clear that all students who do not master early reading skills by third grade are in danger of scoring lower in sixth grade. Students whose primary language is not English are more likely to remain in the lowest achievement level by the sixth grade. Sixty-five percent of the non-English speaking students who scored in the lowest achievement level in third grade in 1997 remained in the lowest achievement level in sixth grade, while fifty-four percent of English-speaking students who scored in the lowest achievement level in 1997 remained in the lowest achievement level by sixth grade. [3]

Graph 3


Students Whose Primary Language is English and Scored in the Low Achievement Level in 1997
3rd Grade 1997
6th Grade 2000
Lowest Achievement Level 27%
At or Above National Average 47%
Lowest Achievement Level 54%
At or Above National Average 15%

Graph 4


Students Whose Primary Language is Not English and Scored in the Low Achievement Level in 1997
3rd Grade 1997
6th Grade 2000
Lowest Achievement Level 62%
At or Above National Average 15%
Lowest Achievement Level 65%
At or Above National Average 8%

The attainment of academic skills in the elementary grades is directly related to academic success in later grades. There are significant implications for students who do not gain the necessary reading skills, because they face significant obstacles in future academic and life endeavors. For example, according to existing research, students who do not possess early reading skills are significantly more likely to drop out of high school in later years.

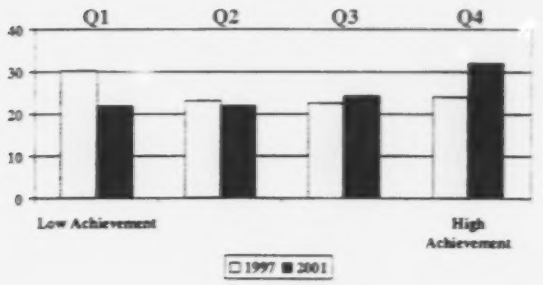
Middle School (Grades 6-8) Mathematics

Statewide, the Mathematics percentile ranks for middle schools (grades 6-8) have increased steadily over the past five years. Furthermore, Arizona schools have significantly shifted students to higher achievement levels during that period. The number of students in the lowest achievement level has decreased by 8%, while the number of students in the highest achievement level has increased by 8%.

[3] Numbers will not add up to 100 percent, since the graphs do not depict neither the group of students that are not in the lowest achievement level nor the group that are at or above the national average.

Graph 5

6th-8th Grade Mathematics Achievement
1997 to 2001



This upward shift represents an improvement in the attainment of important mathematics skills that are related to the Arizona Academic Standards. For example, Arizona students who are at or above the national average are more capable of performing the following important mathematical skills:

- Solve everyday problems using fractions, decimals and percents
- Solve problems relating to size, shape, area and volume of objects
- Solve simple linear equations and inequalities

The ability to use fractions is an essential skill to performing well in Algebra, the gateway to high school mathematics. A look at the Fractions and Algebra components of the Stanford 9 highlights this relationship. A 4% increase in the number of students who perform at or above average in 7th grade Fractions is reflected as a 3% increase in the number of students who perform at or above average in 8th grade Algebra performance.[4]

Middle school math prepares students for high school. Students who successfully master these essential academic skills during middle school are better prepared for high school. The issue of high school readiness is important, because students who enter 9th grade prepared for high school level coursework are much more likely to successfully demonstrate proficiency on the high school Academic Standards.

Conclusion

The purpose of the Stanford 9 test is to provide information from a national perspective about the academic performance of Arizona schools and students. Percentile rank scores, however, must be considered in conjunction with academic skills. The discussion of academic skills is consistent with the shift on behalf of Arizona schools to align curriculum and instruction to the Arizona Academic Standards. The Arizona Instrument to Measure Standards (AIMS) test is the most direct measure of whether students have demonstrated proficiency on the important skills identified by Arizona educators through the Arizona Academic Standards. The AIMS test focuses exclusively on the Arizona Academic Standards and coupled with the national perspective of the Stanford 9, the AIMS test completes the state assessment system.

[4] Fractions at 7th grade increased from 70.3% in 1997 to 74.7% in 2001. Algebra at 8th grade increased from 80.1% in 1997 to 82.8% in 2001.

APPENDIX

Table of Graph 1:

Third Grade Reading Achievement
1997 to 2001

	Quartile			
	1st	2nd	3rd	4th
1997	31%	26%	23%	21%
2001	26%	26%	25%	24%
	Low	**Ntl Avg**		**High**
		Achievement		

Table of Graph 2:

Achievement by Primary Language
Third Grade Reading 2001

	Quartile			
	1st	2nd	3rd	4th
English	22%	25%	26%	27%
Non-English	46%	30%	17%	7%
	Low	**Ntl Avg**		**High**
		Achievement		

Table of Graph 3:

Low Achievement in 1997
Primary Language is English

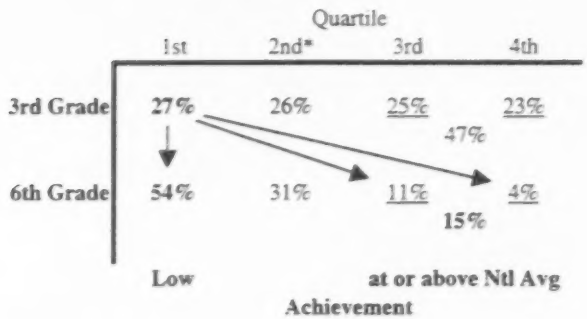


Table of Graph 4:

Low Achievement in 1997
Primary Language is Not English

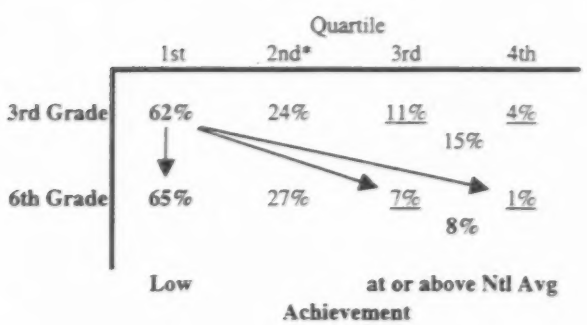
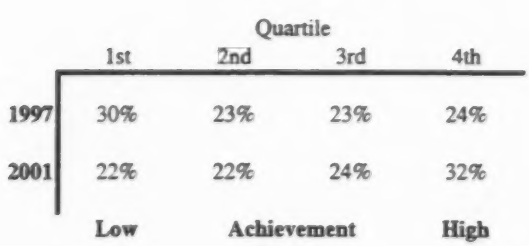


Table of Graph 5:

6th-8th Grade Mathematics Achievement
1997 to 2001



*2nd quartile is not depicted in Graphs 3 or 4